



A NASA Space Act Company

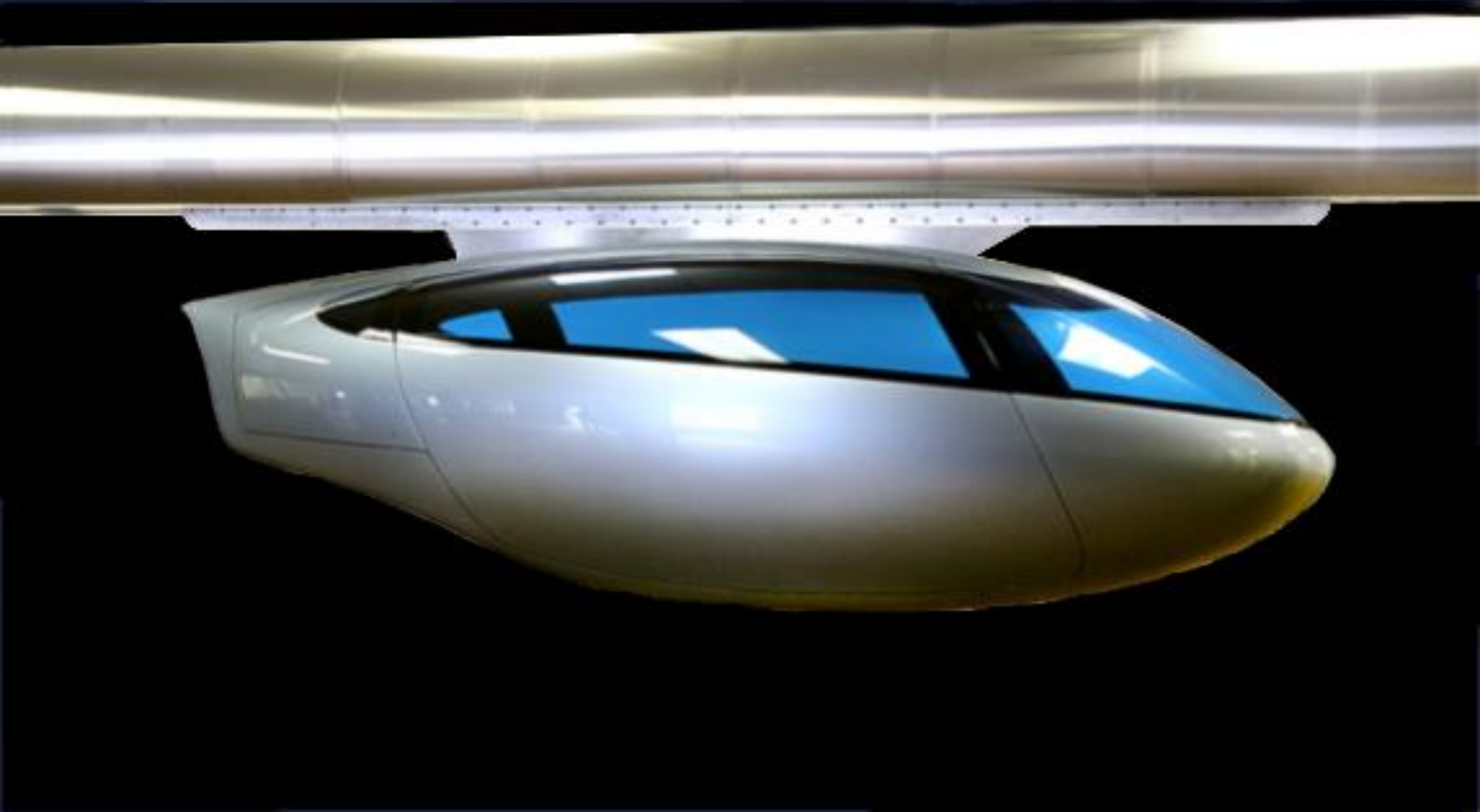
Robert Baertsch, PhD  
Co-founder

# skyTran<sup>TM</sup>

A NASA Space Act Company



AMES RESEARCH CENTER  
NASA RESEARCH PARK











# 21<sup>st</sup> Century Problem: Congestion

*Which leads to:*  
**Pollution**







UK..... \$4+ billion dollars

USA..... \$63+ billion dollars

Germany.....\$5 billion dollars

India.....\$10 billion dollars



# 21<sup>st</sup> Century Solution: **skyTran**



High-Speed, Green, Low-Cost, Elevated PRT

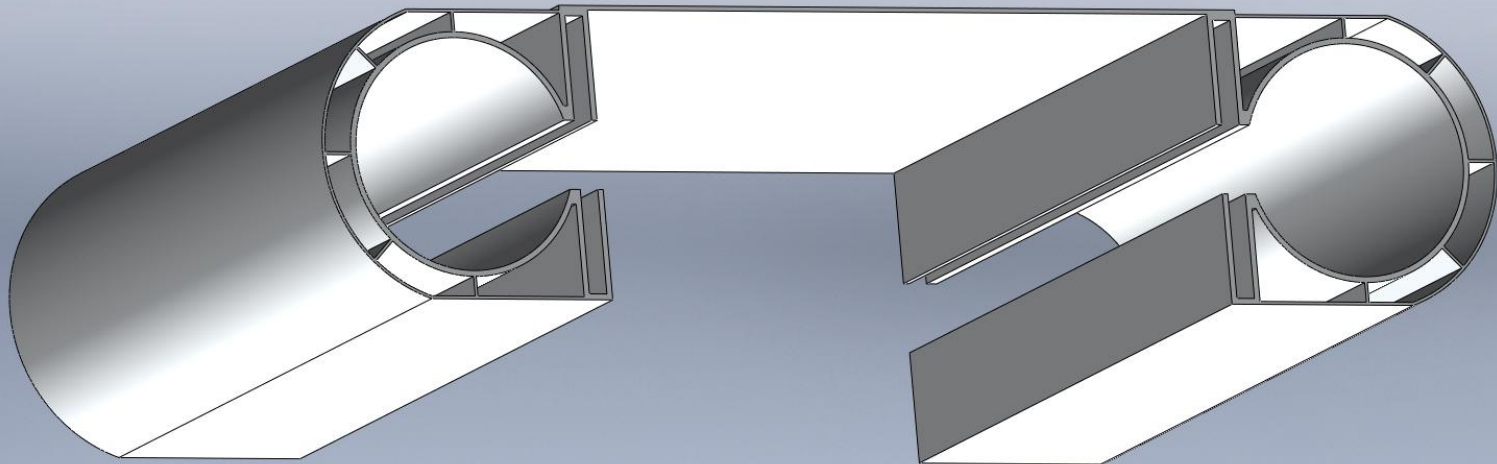
# skyTran Features

- Elevated—Above Traffic
- High Capacity
- Up to 100 mph
- Low Cost
- Silent
- Low impact
- Low Energy Consumption
- On Demand—Similar to a Limo
- Door-to-Door Service—No Stopping at Others' Stations

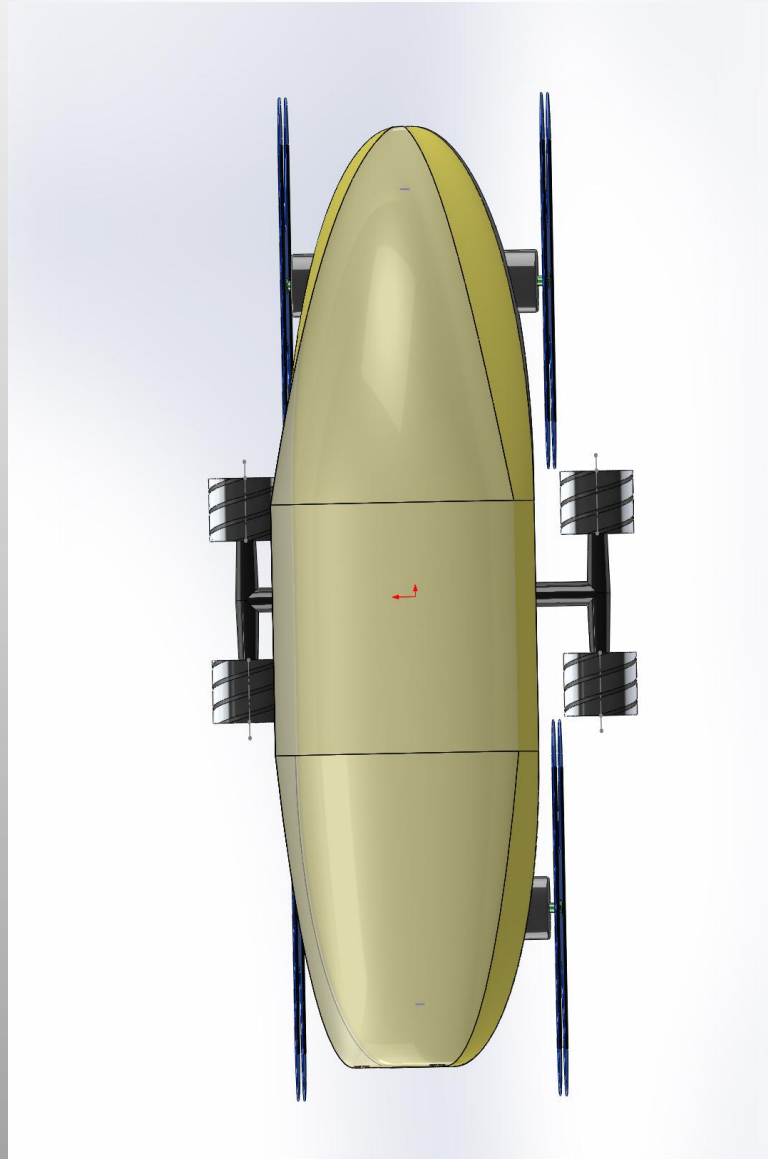




## How Does it Work?

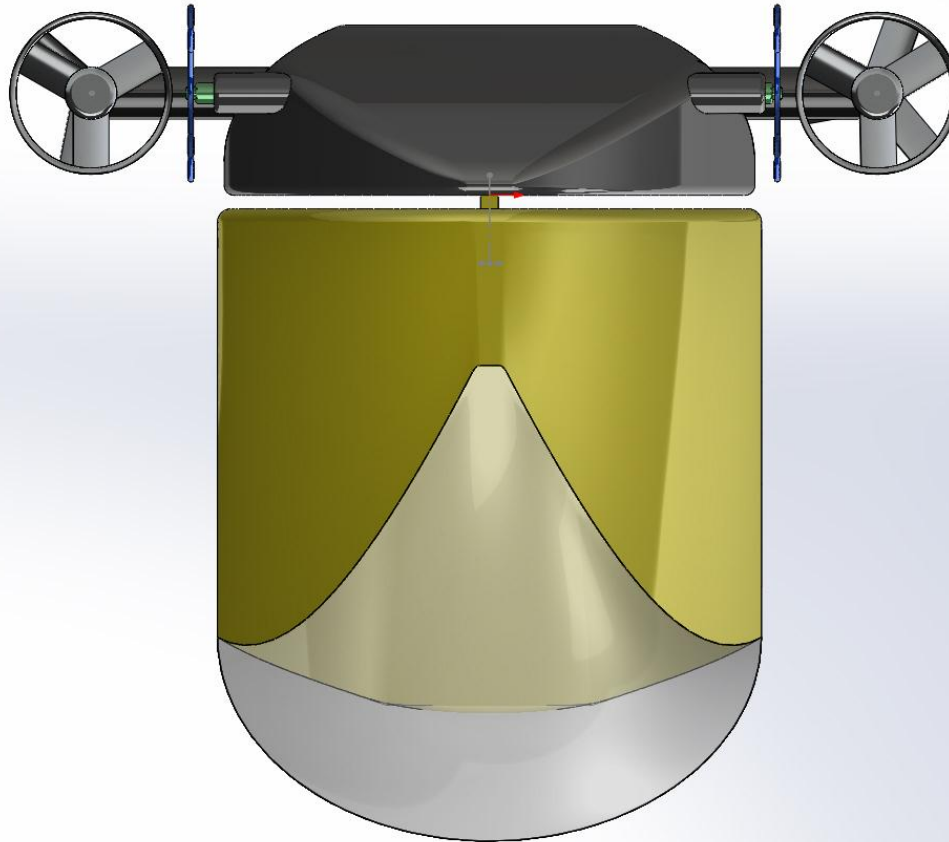


## REACTION RAILS Inner Guideway

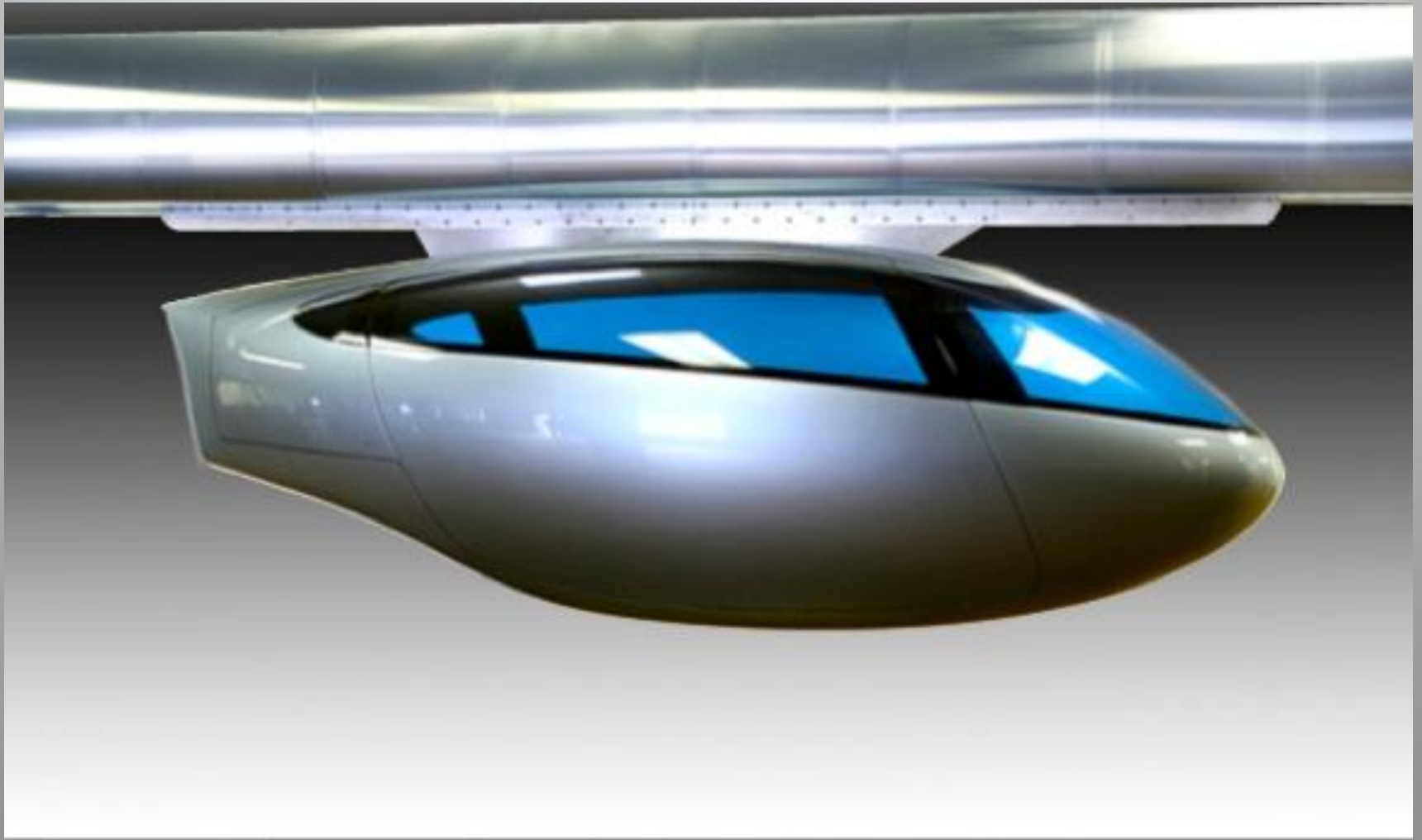


**Vehicle (seen from below)**





**Hanging Vehicle**

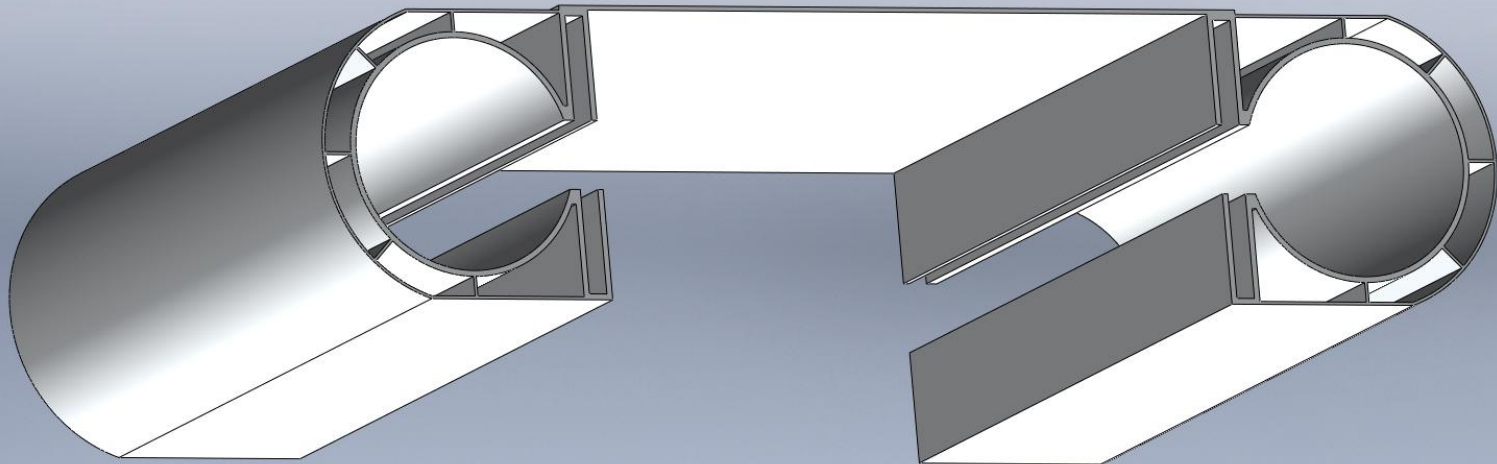


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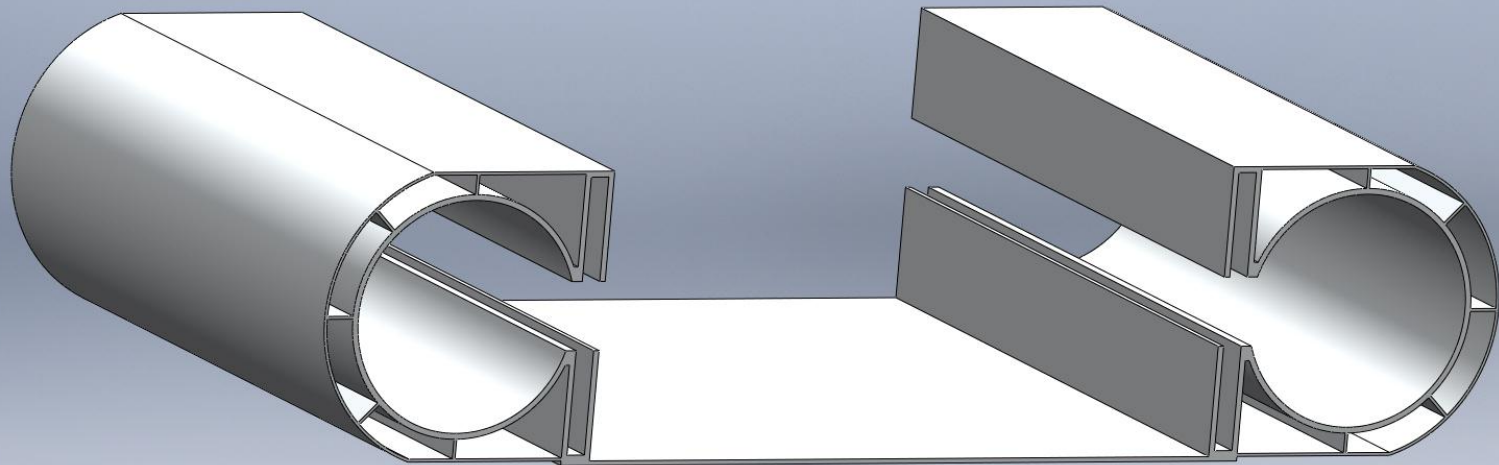
## Hanging Vehicle



**What if we flip this over?**

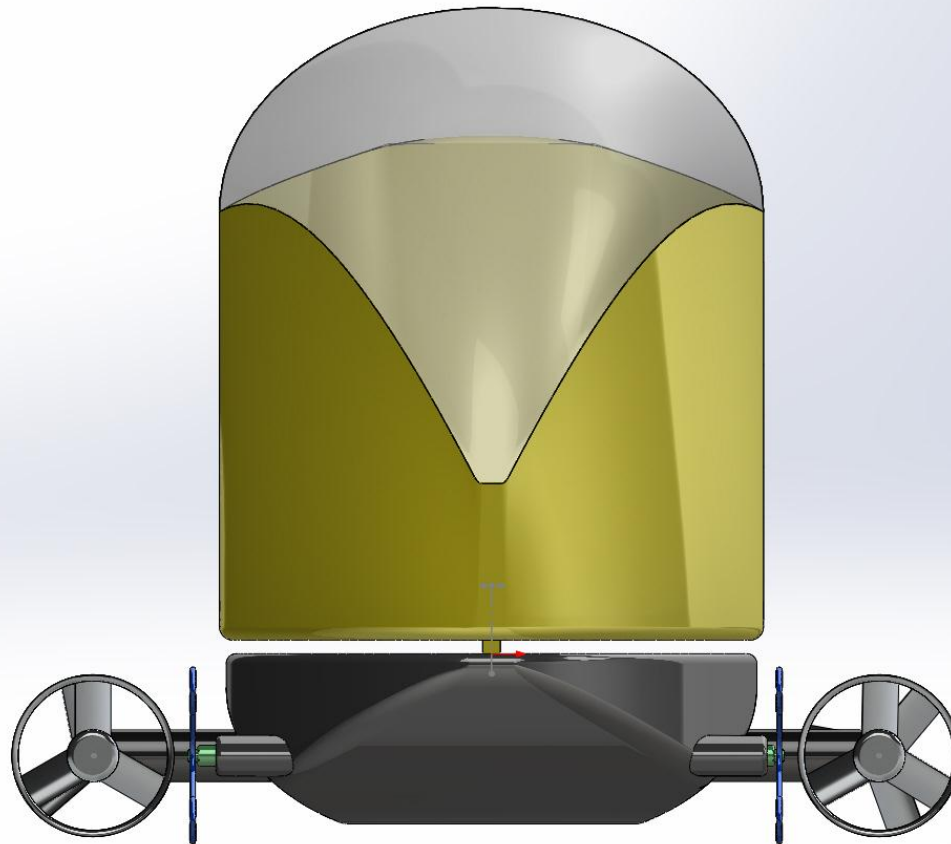


**REACTION RAILS Inner Guideway**

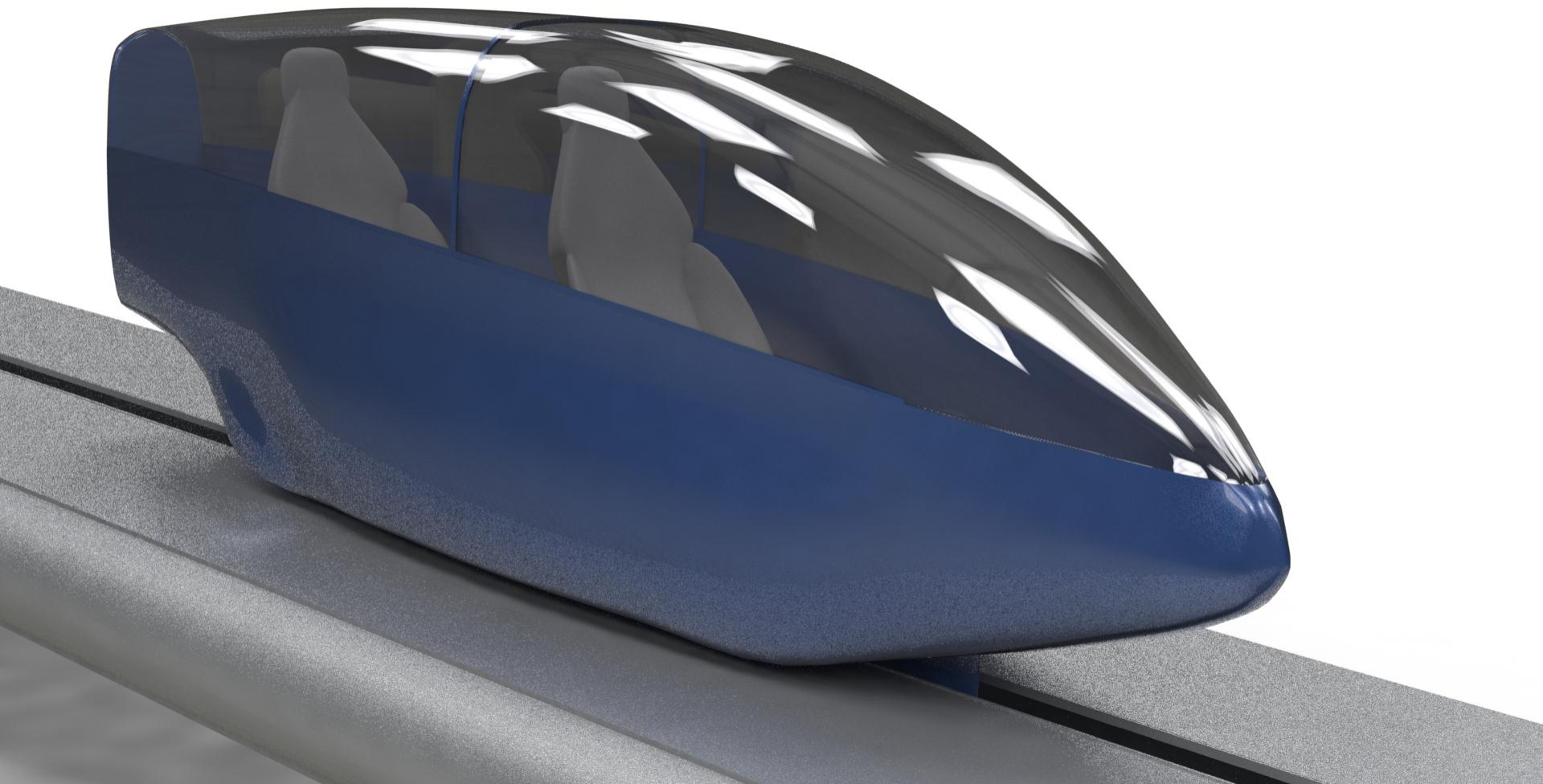


## REACTION RAILS Inner Guideway





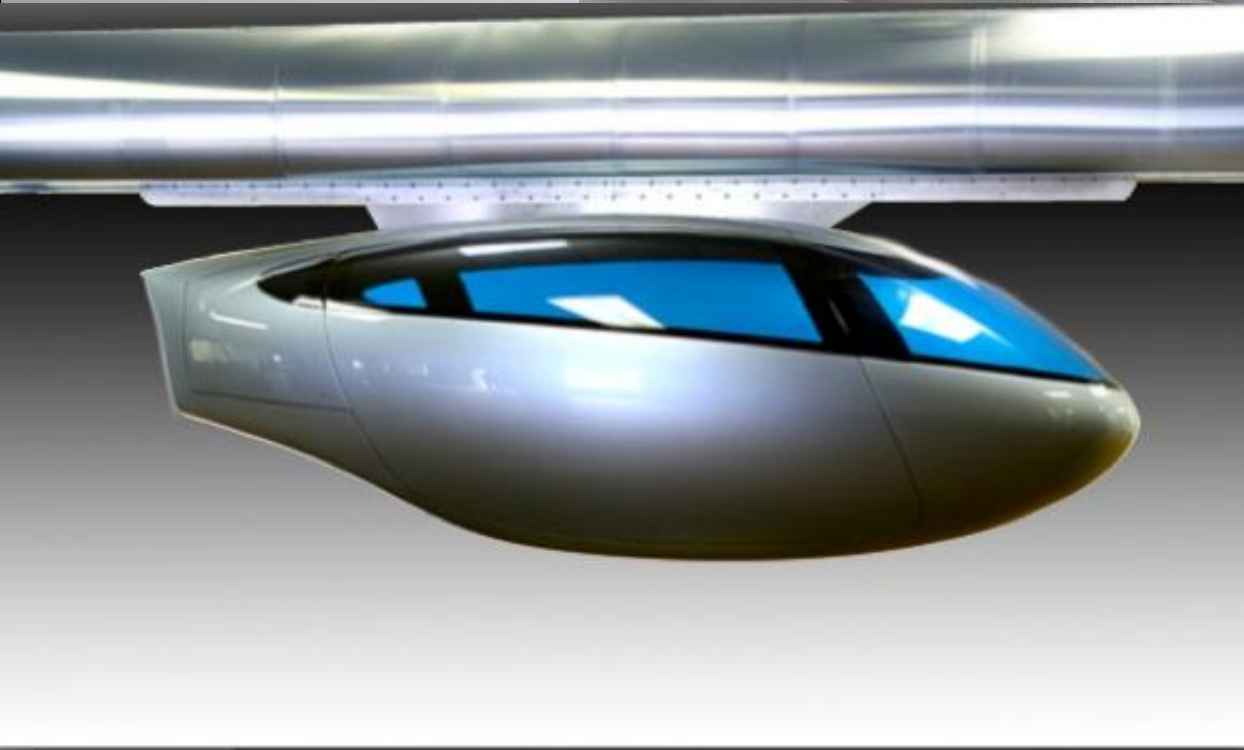
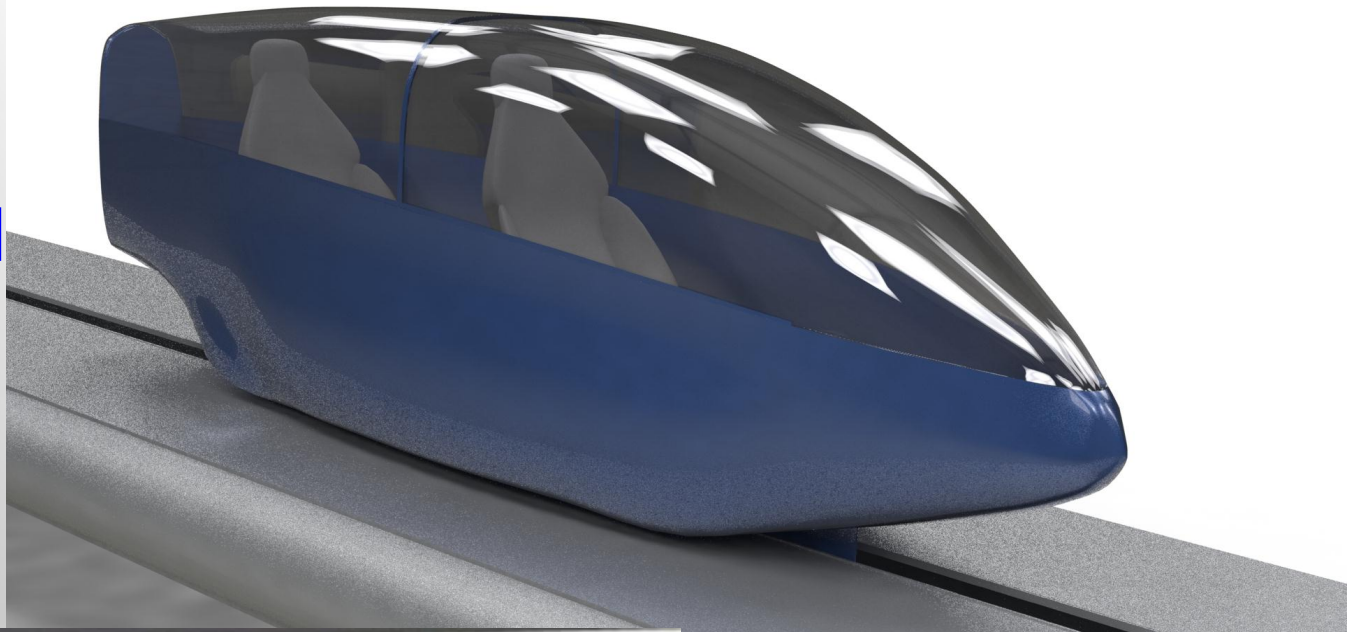
**Riding Vehicle**



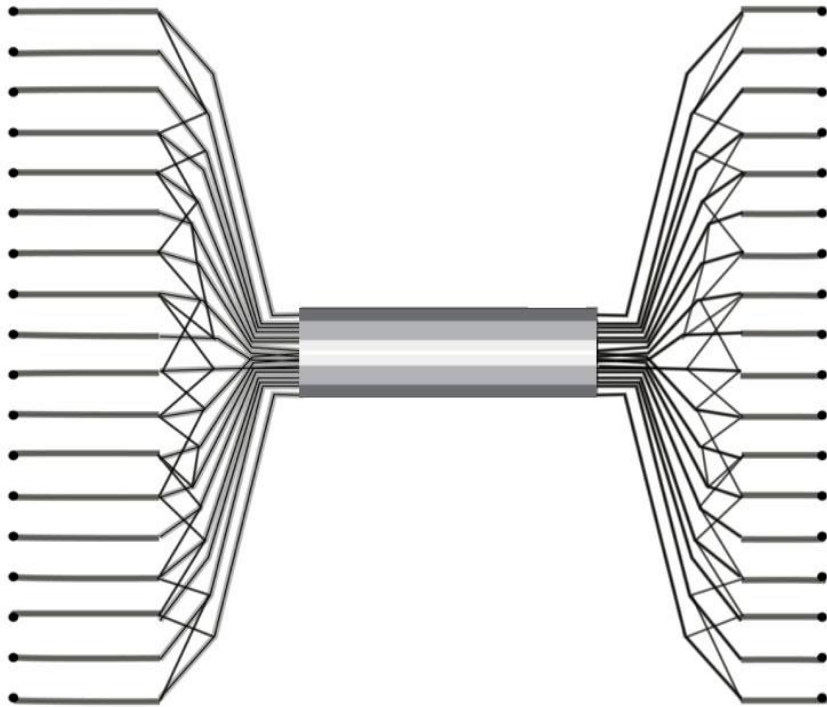
## Riding Vehicle



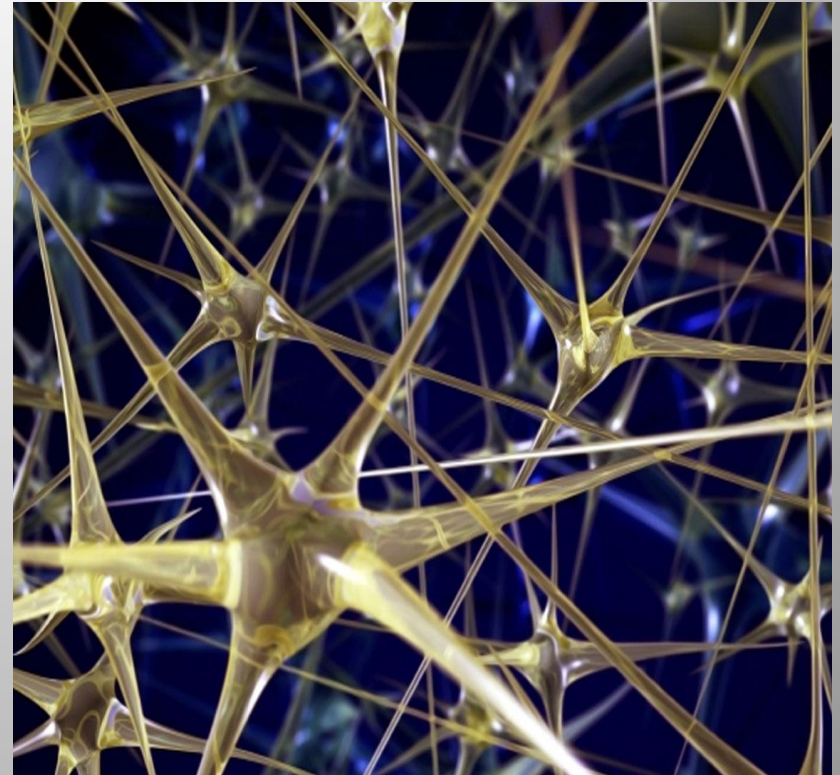
**UP OR DOWN**



**BEST IN CLASS**



Legacy Mass Transit:  
Bottleneck by Design



skyTran:  
Redundant by Design  
Similar to a Brain's Neural Network



# Legacy Mass Transit

A photograph of a crowded subway platform. A large group of people is standing on the platform, waiting for a train. The platform is dimly lit, with a bright light source visible in the distance. A train is partially visible on the right side of the frame, with the name "Gregorio Marañón" and "Andén 2" visible on its side. The overall atmosphere is one of a busy, crowded public transit system.

Crowded Waits and Fixed Schedules



skyTran



Always There and On Demand



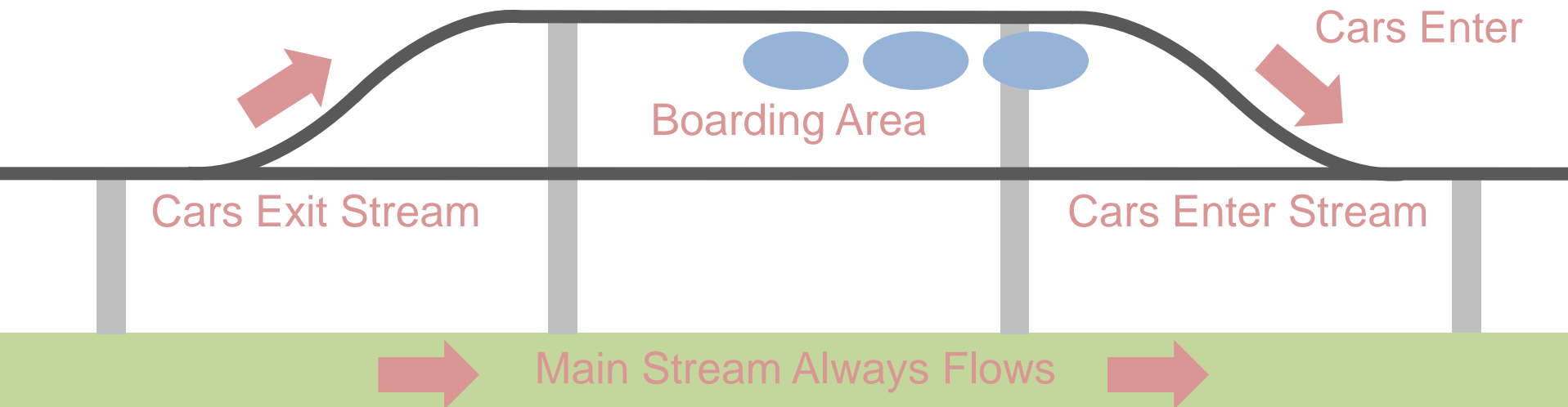
# Legacy Mass Transit

An aerial photograph of a busy urban street in Bangkok, Thailand. The street is filled with a variety of vehicles, including large blue and white buses, smaller white vans, yellow taxis, and numerous cars. The traffic is dense and appears to be moving slowly. On the left side of the street, there is a pedestrian bridge with a metal railing. On the right side, there is a concrete pillar supporting an elevated transit structure. The background shows a mix of green trees and modern high-rise buildings. The overall scene depicts a typical busy day in a city with a legacy mass transit system.

Slow: All the Stops, All the Time

## Fast

- No Extra Stops
- Available Anytime
- Stations are off the Main Line





# Legacy Mass Transit



# Legacy car Transit



**Surface Safe?**

## Sky Safe



- Redundant vehicle, guideway and network safety systems
- Vehicle collision avoidance radar linked to emergency braking
- Vehicle air bags & seat belts
- Bogie-mounted bumpers & crumple zones
- Guideway sensors detect and alert vehicles to abnormal conditions



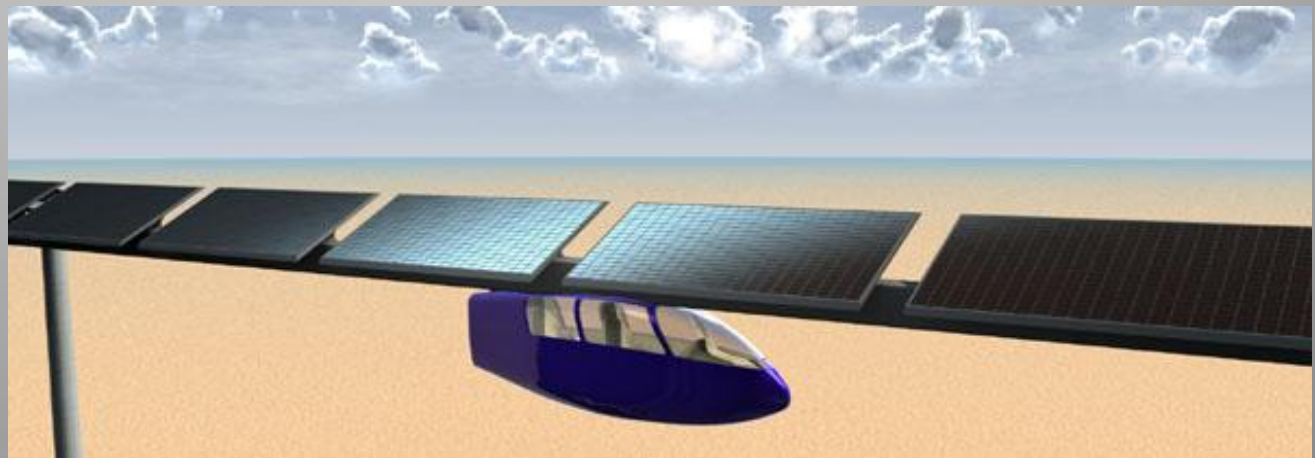
# Legacy Transit



Bad for the Environment

# skyTran: **Green** Good for the Environment

- **Powered by Renewable Energy**
- **Efficient: solar-powered, kinetic energy-powered**
- **1/3 the power of cars**



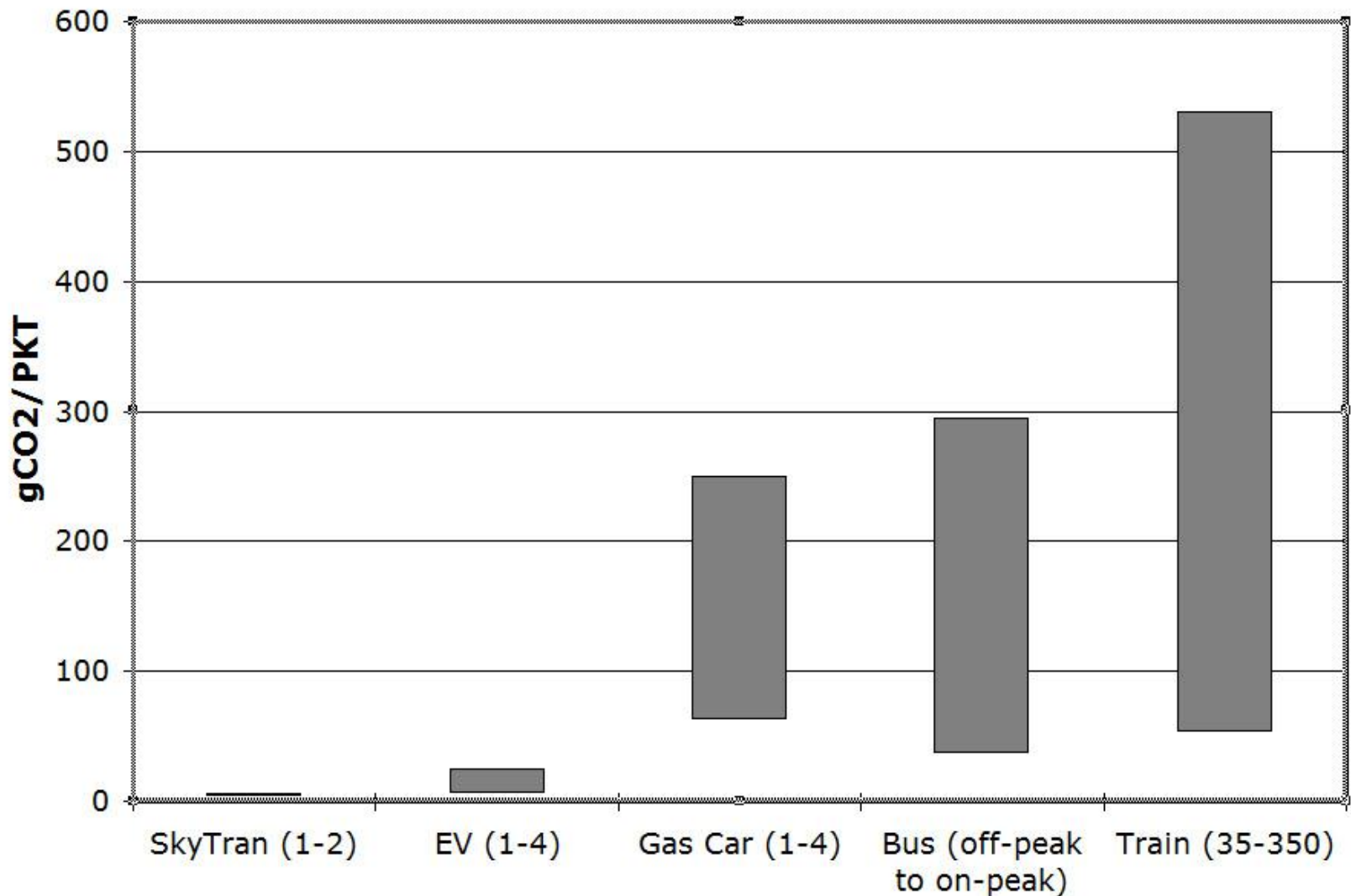
# Energy Consumption

Vehicle Type	Watt Hours per Mile per passenger
25 mpg gasoline car	1500*
50 mpg hybrid	750*
40' bus (25 pass.)	673*
70-100 mpg Plug-in hybrid	>300
Fully Electric	250
London Underground	170
SkyTran Maglev PRT	100

\* Not including energy consumed during refining



# CO2 comparison per passenger kilometer




Data from Chester & Horvath (2 different papers) (Environmental Research Letters, a publication of Britain's Institute of Physics. 4 (2009) and 5 (2010))

**Electric Vehicles Greener than Liquid Fuel Vehicles**  
**SkyTran PRT Greener than EVs**

Sustainability Challenges Solved by SkyTran				
	GHG	Land Use	Cost	Congestion
BRT				
Biofuels				
PHEV EV				
SkyTran				



# Legacy Infrastructure



Obtrusive, **Large**





# skyTran

## Unobtrusive, Minimal Infrastructure



A photograph showing two workers in white hard hats and high-visibility safety vests (one green, one yellow) kneeling in a grassy field. They are inspecting a white, cylindrical SkyTran station mounted on a concrete base. The worker on the left is wearing a green vest and the worker on the right is wearing a yellow vest. In the background, there is a grassy area with a fence and some trees.

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21<sup>st</sup> Century, High-Paying, Productive Jobs



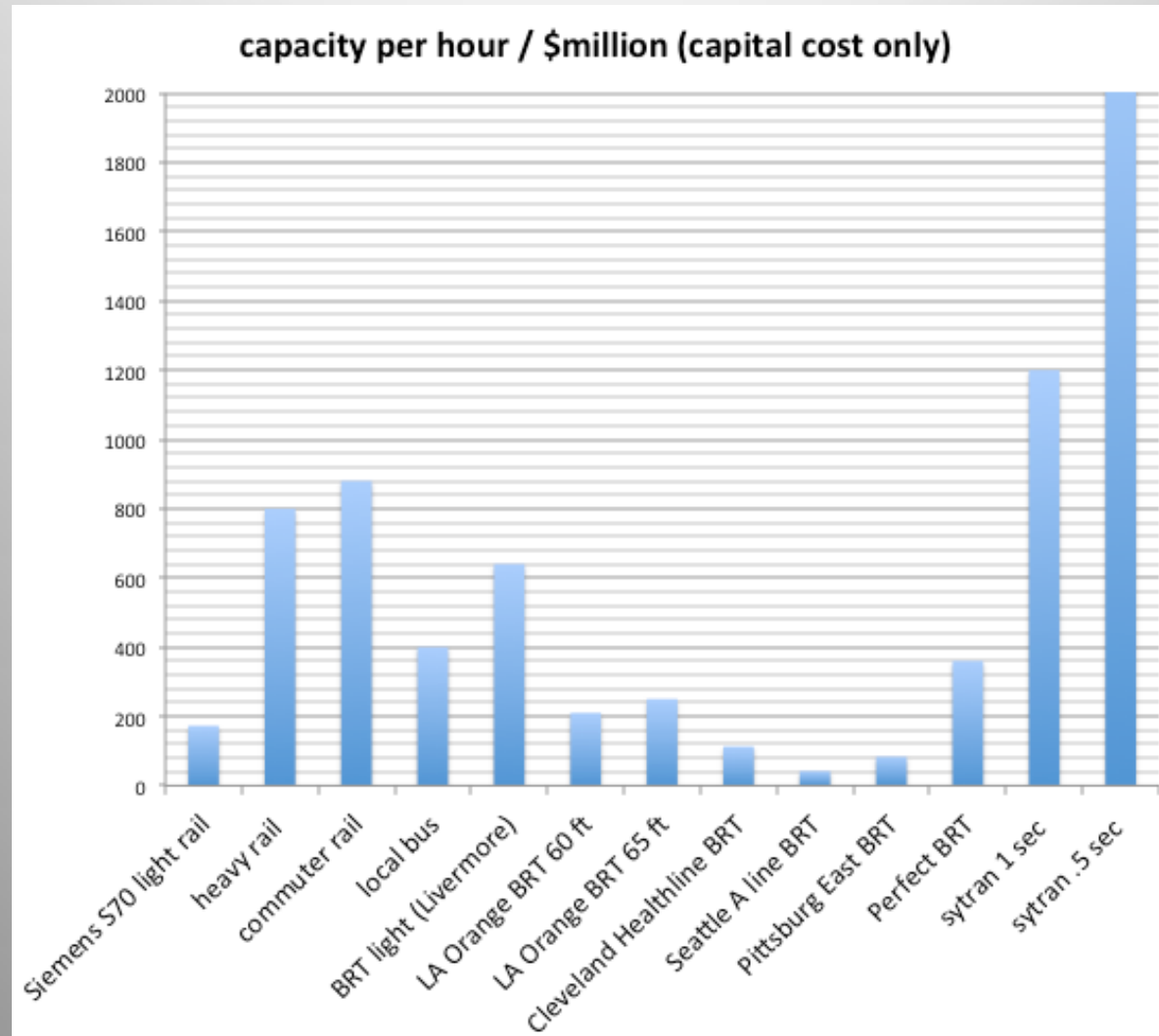
# skyTran Economics



Mass Production = Economy of Scale



# Capacity per hour per \$million



# Cost Comparison

- |                          |             |
|--------------------------|-------------|
| • Elevated Commuter Rail | \$200M/mile |
| • Light Rail             | \$100M/mile |
| • Freeway (Per Lane)     | \$ 40M/mile |
| • <b>skyTran</b>         | \$ 10M/mile |





# skyTran Capital Cost

• Installed Guideway		<b>\$10M/mile</b>
• Station	Small	<b>\$350K</b>
	Medium	<b>\$750K</b>
	Large	<b>\$2M</b>
• Vehicle	Modest Vehicle	<b>\$15K</b>
	High-End Vehicle	<b>\$30K</b>



# skyTran Example

## System Assumptions

• Specs	Track Length	20 miles
	No. of Stations	40
	Vehicles/System	1000-2500
• Op-Ex	Average Speed	40mph
	Average Trip Length	10 miles
	Headway	0.5sec
	Vehicle Occupancy	66%

# skyTran Fare sensitivity

*Profitability, Ridership, Fares per mile*  
(\$ millions per year)

		\$0.20	\$0.30	\$0.40	Fare per mile
Riders per day	5,000	\$(11.62)	\$(9.79)	\$(7.97)	
	10,000	\$(10.16)	\$(6.51)	\$(2.86)	
	20,000	\$(7.24)	\$0.06	\$7.36	
	30,000	\$(4.32)	\$6.63	\$17.58	
	40,000	\$(1.40)	\$13.20	\$27.80	
	50,000	\$1.52	\$19.77	\$38.02	
	60,000	\$4.44	\$26.34	\$48.24	
	70,000	\$7.36	\$32.91	\$58.46	
Saturated	80,000	\$10.28	\$39.48	\$68.68	



A perspective view from the passenger seat of a SkyTran concept car. The car is a small, white, pod-like vehicle with a large central screen. The screen displays a woman in a white uniform interacting with a futuristic interface. The car is suspended from a track, and the background shows a dense city skyline with various skyscrapers under a clear blue sky. The word "skyTran" is visible on the side of the car's interior.

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High-Speed, Green, Low-Cost, Elevated PRT

skyTran™



sapa:

MOOG  
CSA Engineering



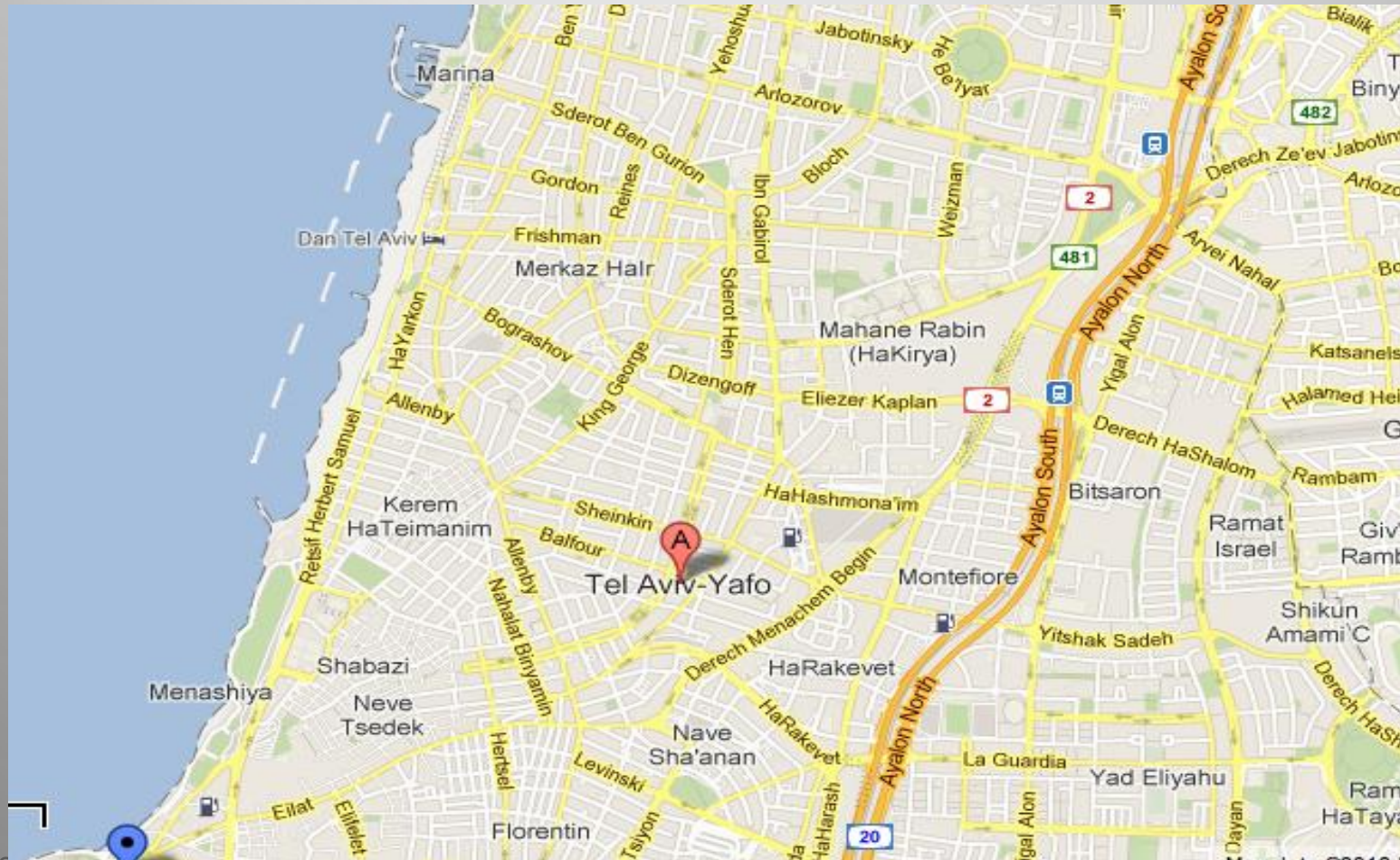
## Strategic Partners

- National Aeronautics & Space Administration – *Systems Development*
- Moog CSA Engineering – *Systems Integration*
- Magna Steyr North America - *Vehicles*
- Sapa Group – *Guideway*
- One Cycle Control – *Power Electronics*
- Nanosolar – *Flexible Solar Panels*
- IDEO – *Human Factors*
- Jenkins, Gales & Martinez – *Civil Engineering*
- Loisos + Ubbelohde – *Architecture/Design*



# skyTran™

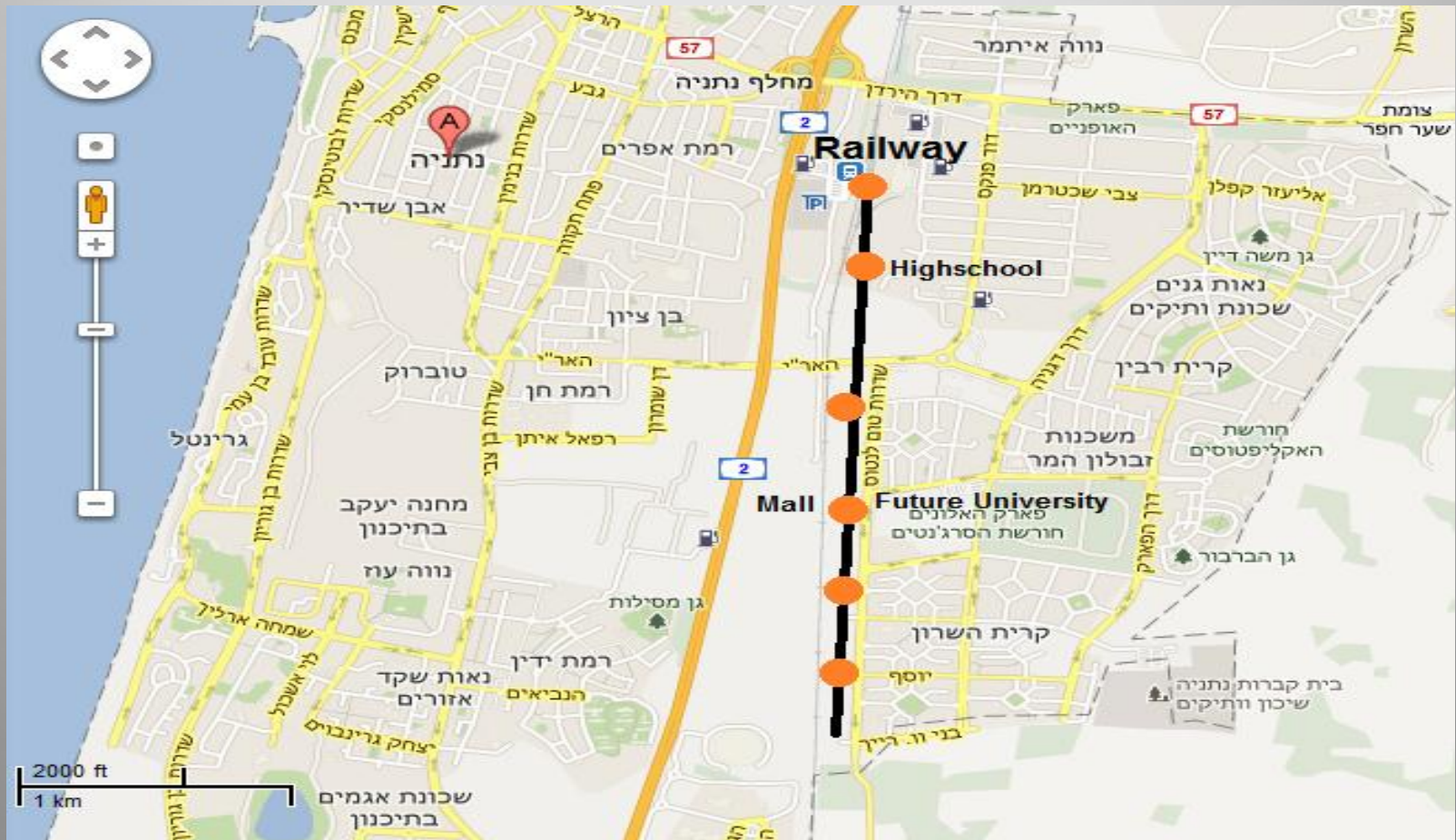
TEL AVIV, Israel:





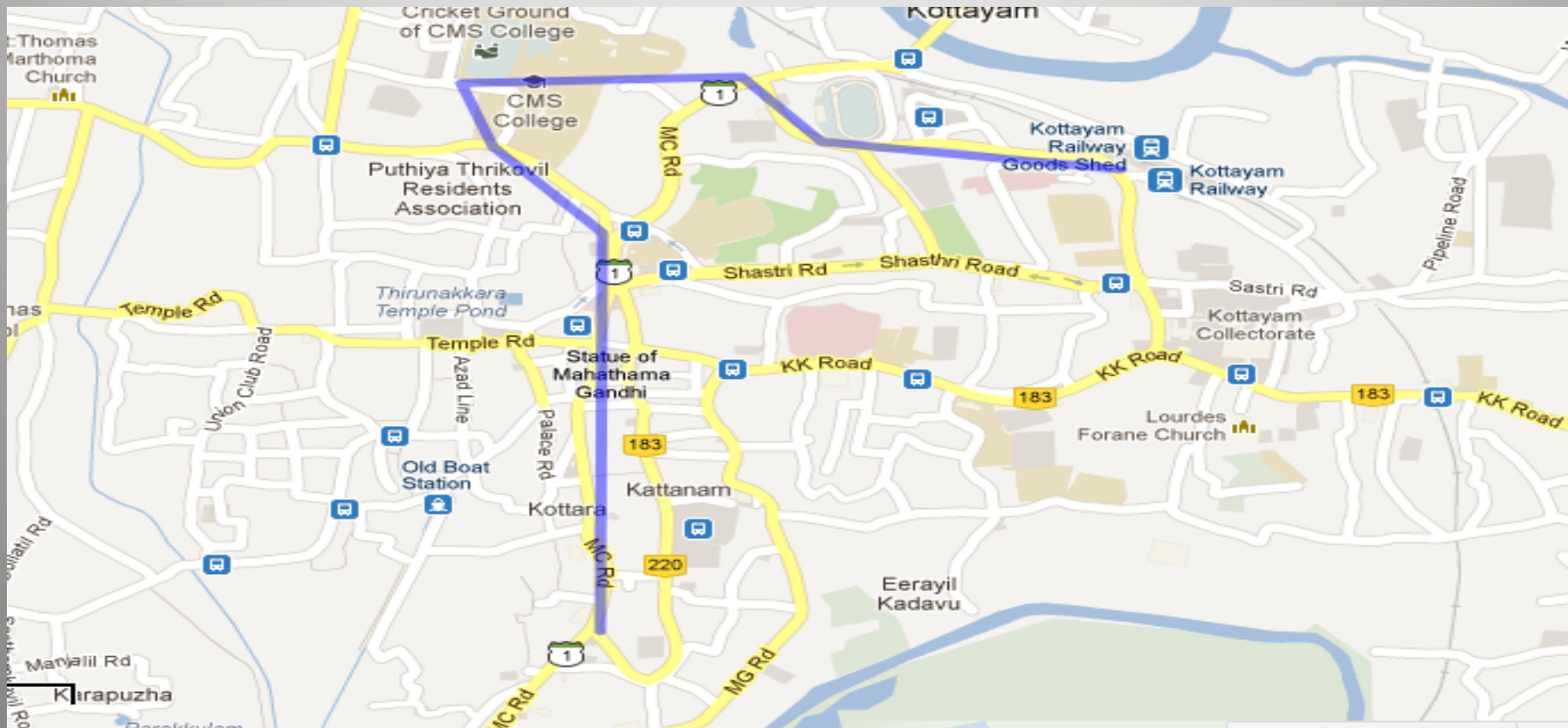
# skyTran™

NETANYA, Israel:



# skyTran™

KOTAYAM, India:



# skyTran<sup>TM</sup>

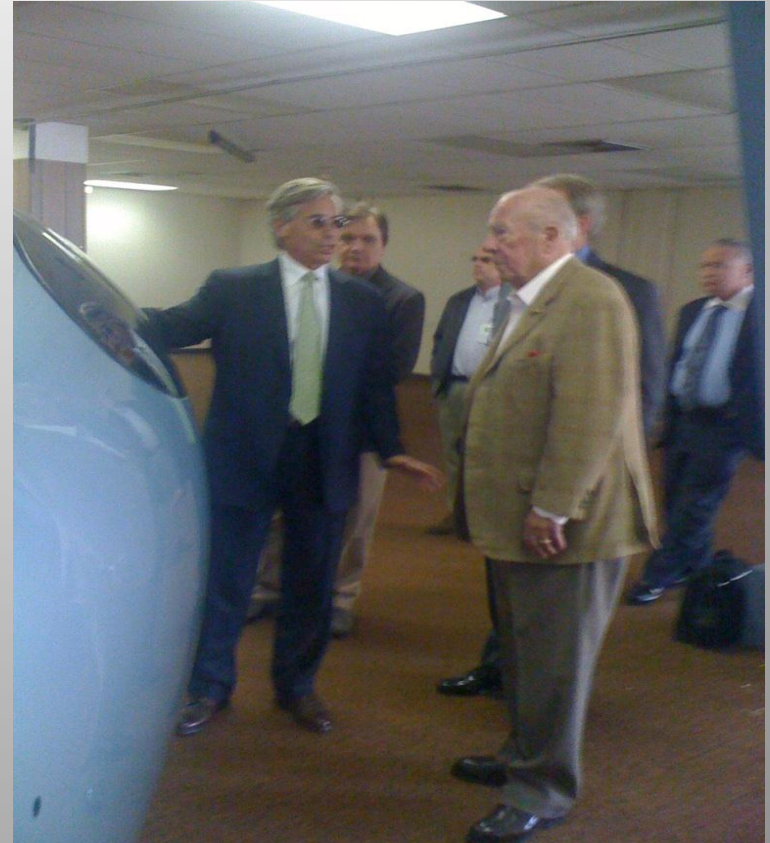
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# skyTran™



**Coming to a station near you!**

# skyTran™

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